Current and Future Water Management in the Savannah River Basin

Presented by
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Hartwell Project

Savannah District

- **3rd Most visited Corps project in the nation**
- **Constructed in 1962**
- **56,000 acre water surface (660 msl)**
- **960 mile shoreline**
- **5 turbines capable of generating 422mw**
- **Largest shoreline management program – 30,000 permitted activities**

Richard B. Russell Project

Savannah District

- **Largest Corps power plant east of the Mississippi River – 540 miles of shoreline**
- **Constructed in 1978 – 1984/5**
- **26,653 acre water surface (475 ft-msl)**
- **Four conventional turbines capable of 328 MW**
- **Four pump turbines capable of 320 MW**
- **26 Recreation sites**
- **4 State Parks**

J. Strom Thurmond Project

Savannah District

- **8th most-visited Corps project in the Nation!**
- **Constructed in 1952**
- **70,500 acre water surface (330 ft-msl)**
- **Seven turbines capable of generating 364 MW**
- **Annual hydropower revenue - $12.3M**
- **1,200 miles of shoreline (> coast of California)**
- **76 Recreation sites**

Project Purposes

- Flood Control
- Hydropower
- Recreation
- Navigation
- Fish and Wildlife Management
- Water Supply
- Water Quality

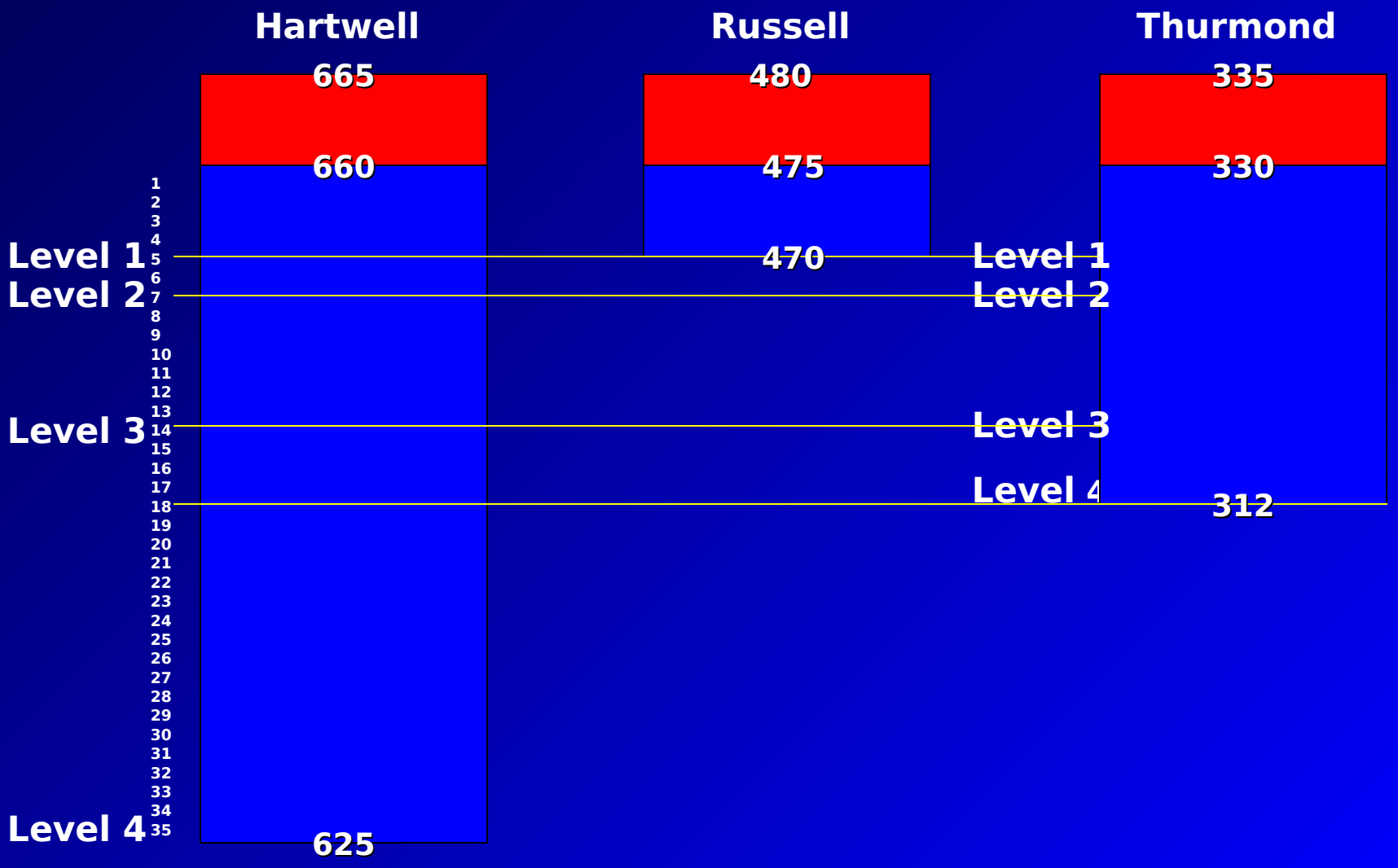
Pool Elevations

Savannah District

	Hartwell	*Russell*	*Thurmond*
Flood Control	**665 msl**	**480**	**335**
Top of pool (summer/winter)	**660/656**	**475**	**330/326**
Minimum Pool	**625**	**470**	**312**

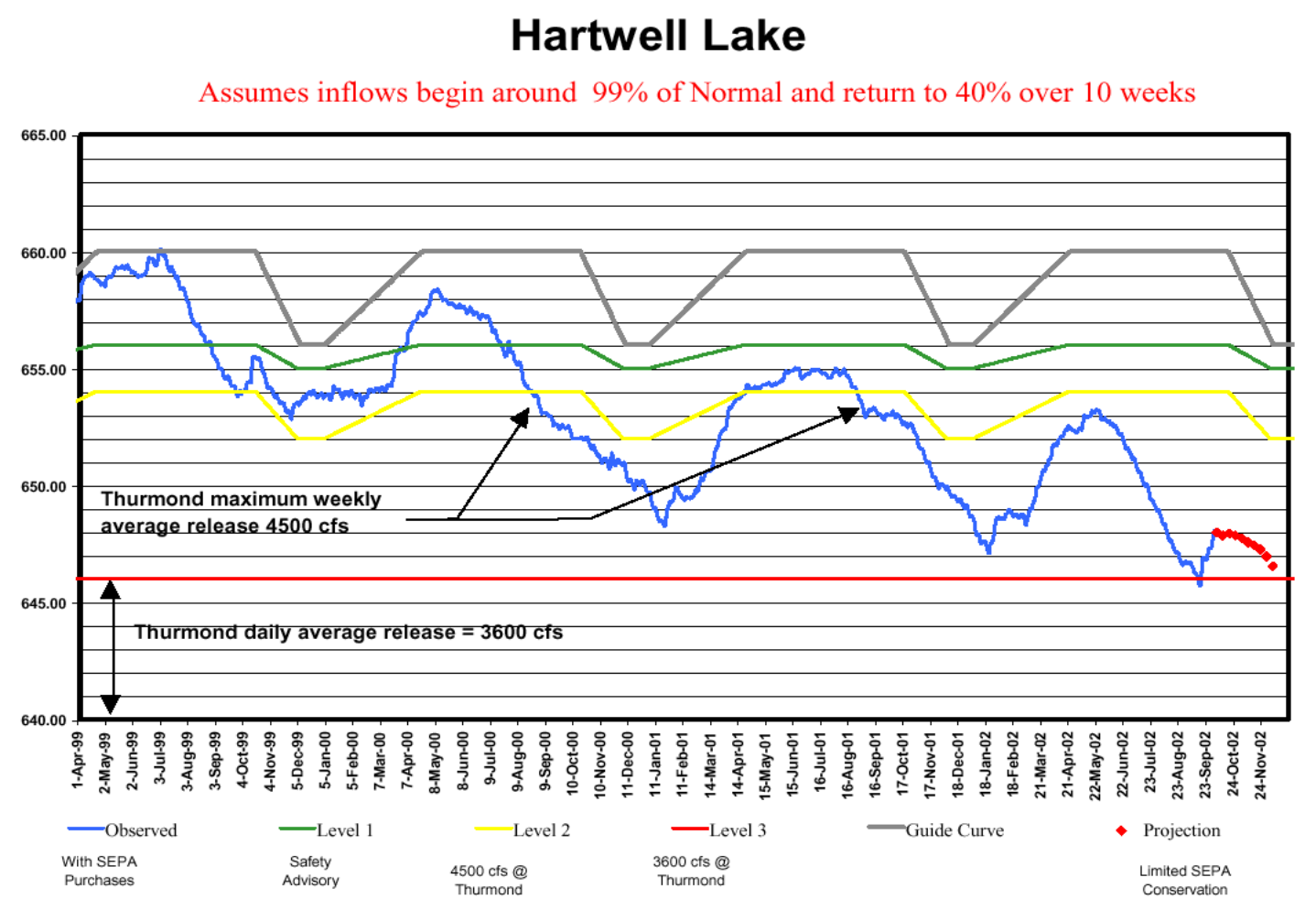
Pool Comparison

Savannah District



Weekly Declaration & Projection

Savannah District



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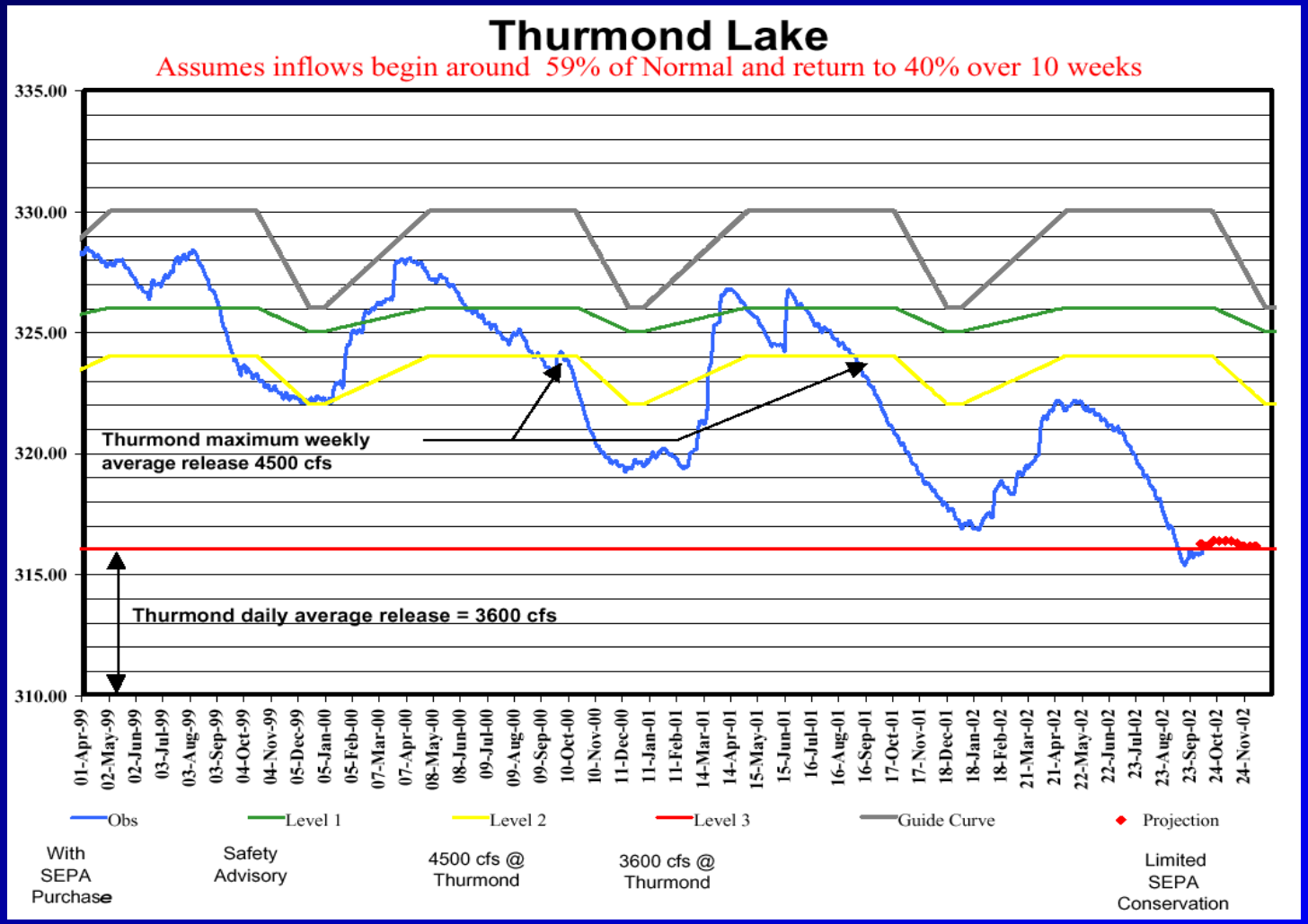


Savannah River Basin Users

Savannah District

- **Lakes Region**
  - **JST- 1,650 Lake Permits**
  - **Hartwell – 10,734 Lake Permits**
  - **3 Lake Total – 17.5 Million Visitors Last Year**
  - **3 Lake Total Water Supply Users**
    - **13 Municipalities**
    - **1 State Park**
    - **1 University**
    - **5 Industries**
  - **20 Hydropower Units – 1,434 MW Capacity**

Savannah River Basin Users

Savannah District

- **River Below JST**
  - **Water Supply Users**
    - 3 Cities * 2 Counties
    - 1 Army Base * 12 Industries
  - **Heavy Recreational Use**
  - **Environmental Concerns**
    - Augusta Shoals – Endangered Species
    - Salt Water Intrusion
    - Savannah River Fish & Wildlife Refuge

Savannah River Drought Plan

Savannah District

- **Developed by Army Corps of Engineers and states of GA and SC in 1989**
- **Reduces discharges at pre-defined triggers**
  - **Level 1 – Public Water Safety Alerts**
  - **Level 2 – Reduce flows to 4500 cfs**
  - **Level 3 – Reduce flows to 3600 cfs**
  - **Level 4 – JST releases = inflows**

Previous Drought Management

Savannah District

- **Drought begins May 1998**
- **Water quality releases May 1999 - Sep 2002 (Level 2 – max 4500 cfs weekly avg.)**
- **Water supply releases Sep 2002 – Nov 2002 (Level 3 – 3600 cfs daily avg)**
- **SEPA purchased $47 (plus) million in replacement energy**
- **Releases from Hartwell and Thurmond averaged about 60% of normal for the drought**

NSBL&D - Fish Passage

Fish Passage

- **NSBL&D Lockage**
  - **Lease w/ Augusta**
  - **Requires 30 – 50 Lockage Events**
  - **Late March into Mid-May**
  - **Facilitates Upstream Fish Migration and Spawning**
  - **Opens up an Additional 18 miles of River above the L&D to the Augusta Shoals**

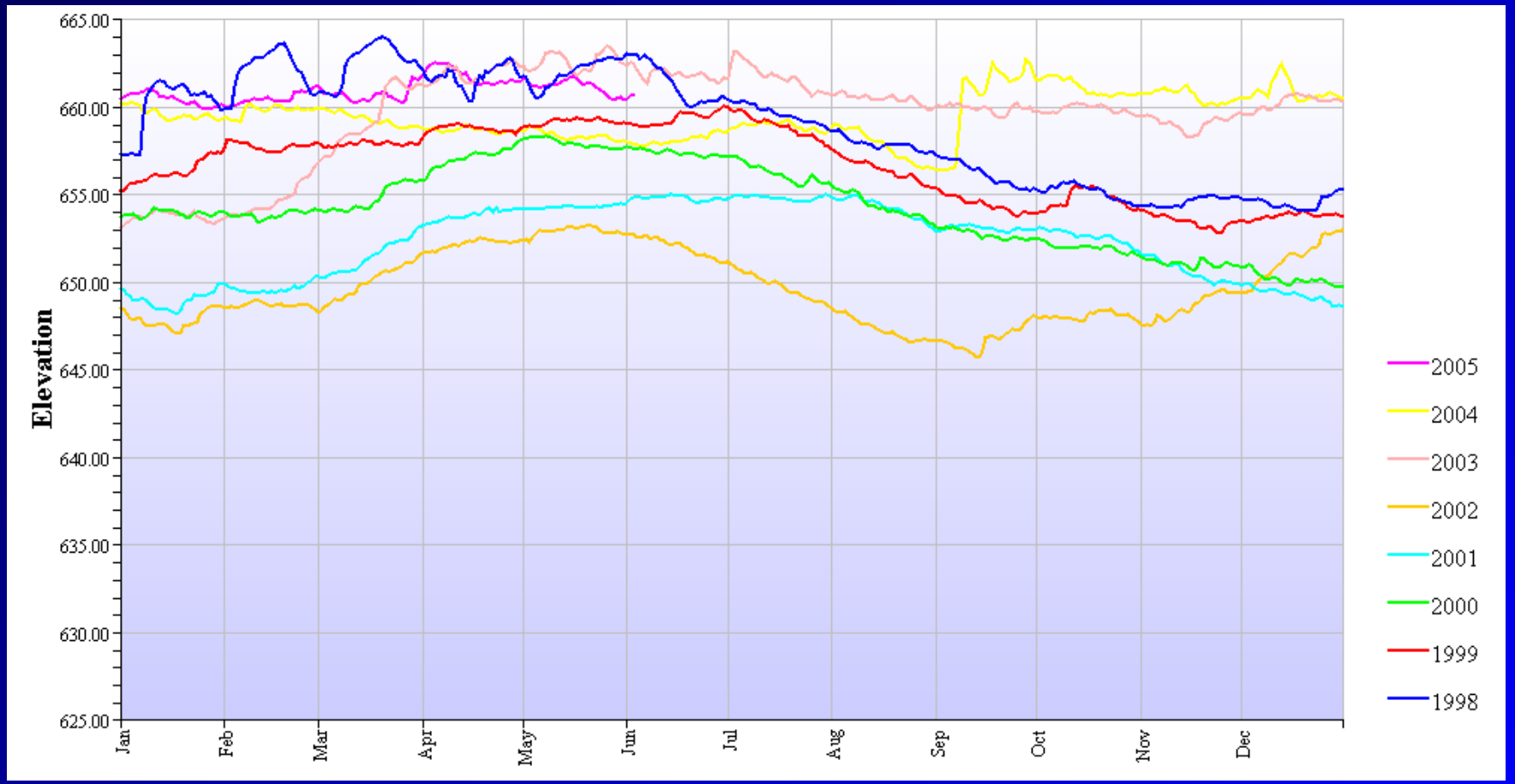
Fish Passage

Savannah District

- Request by Fish and Wildlife Agencies
- 2 pulses of 16,000+ cfs
- Desired just prior to in-lake Fish Spawn
- Needed to store an estimated 1-2 feet in flood pools
- Deviated from Normal Operations by targeting 660 instead of 656

Hartwell
Recent Pool Management

Savannah District



Objectives of Flood Management

- **Minimize damages & loss of life**
- **Use flood storage to store storm inflow peaks**
- **Release flood water after the storm at non-damaging rates**

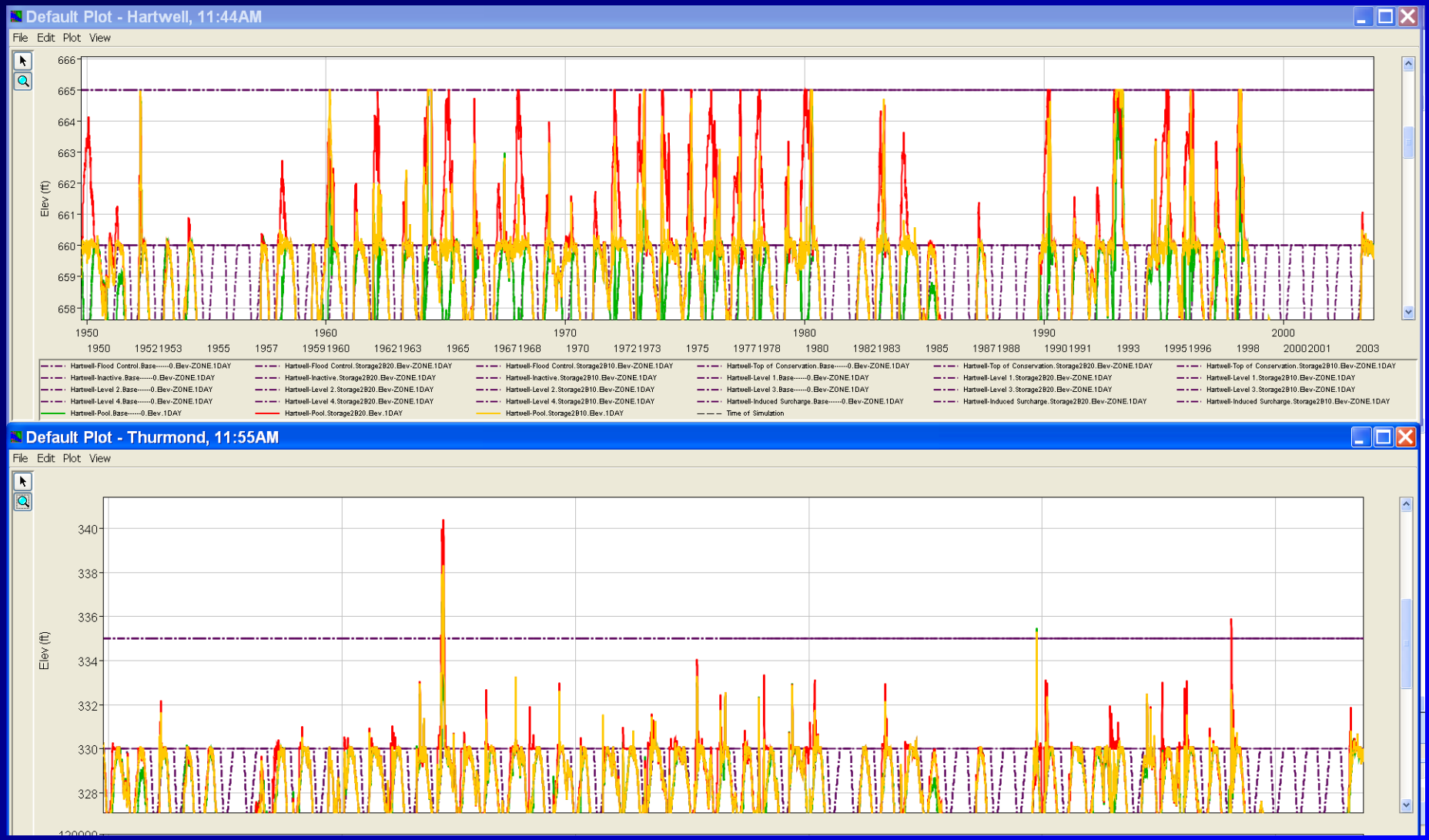
Lessons Learned from 2004/2005

Savannah District

- **Takes 23,000 cfs pulses for successful fish passage**
- **Pulses are not required every year**
- **More monitoring is required to measure pulse effectiveness**
- **Shoreline erosion is more probable when flood storage is limited**
- **Is maintaining higher pools through the winter desired? (How High?)**

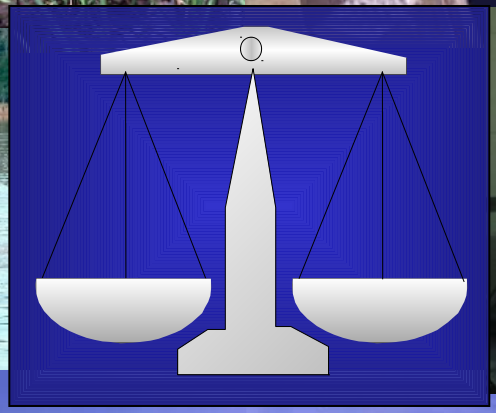
High Pool Tradeoffs

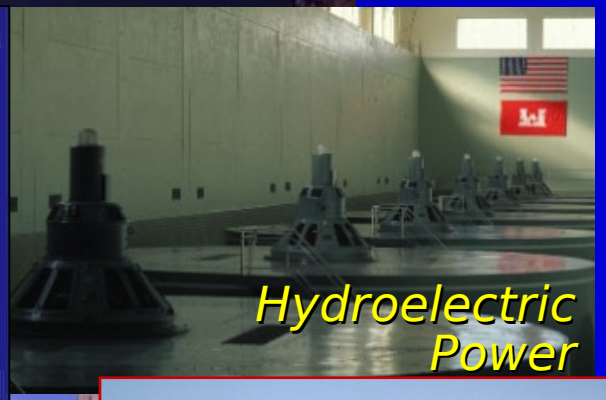
Savannah District

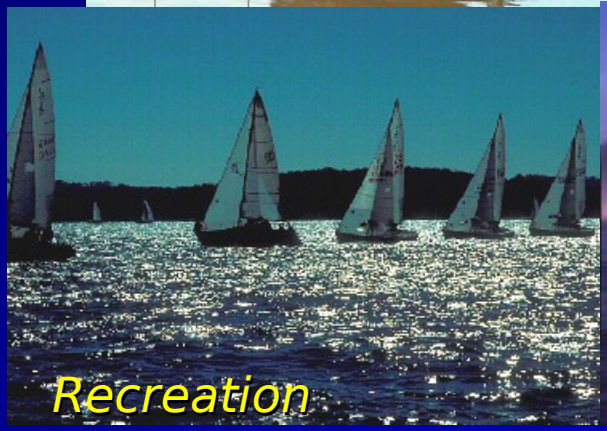


Savannah River Basin Balancing Uses

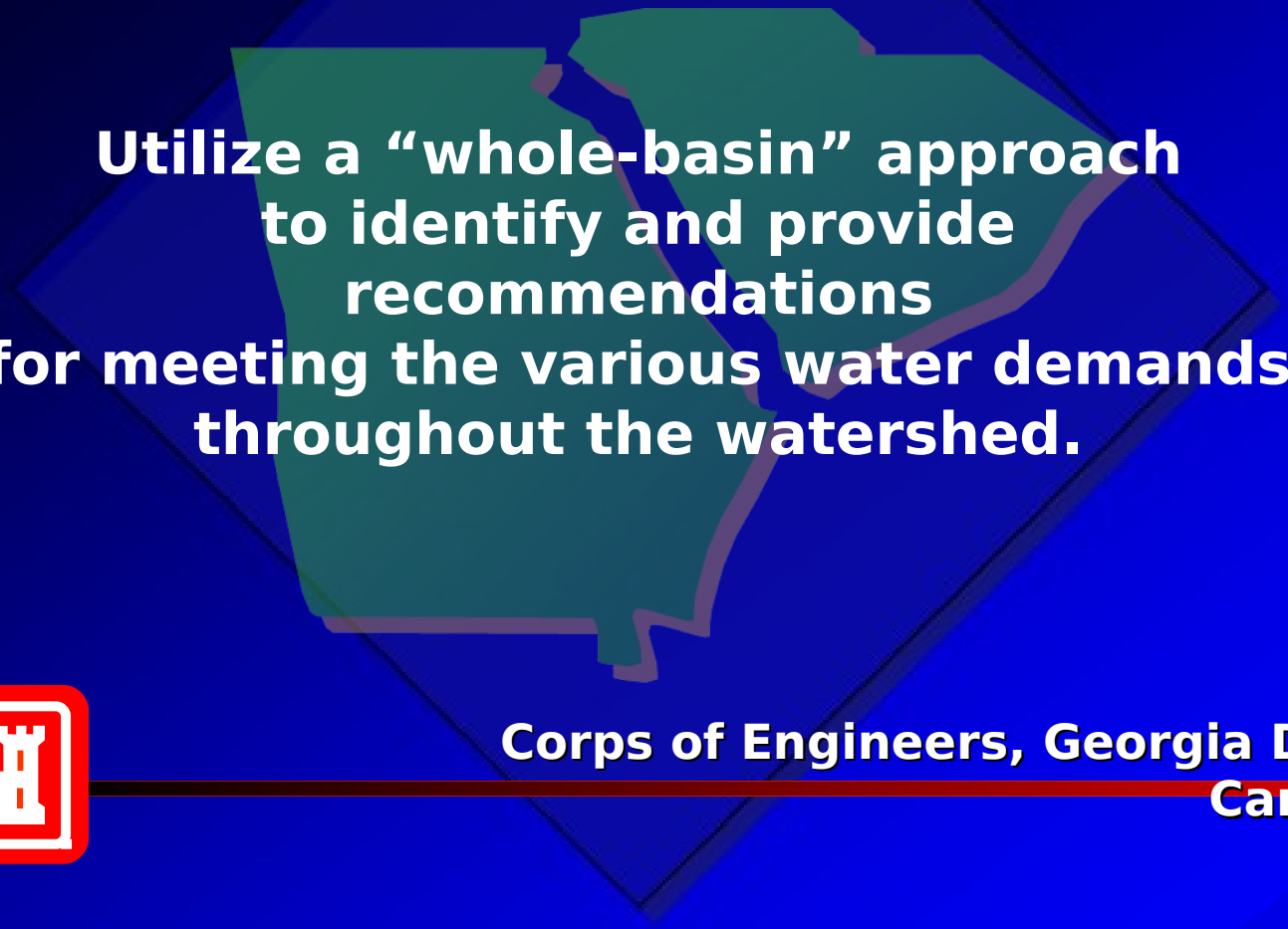
Savannah District







Savannah River Basin Comprehensive Water Resources Study



Utilize a “whole-basin” approach to identify and provide recommendations for meeting the various water demands throughout the watershed.

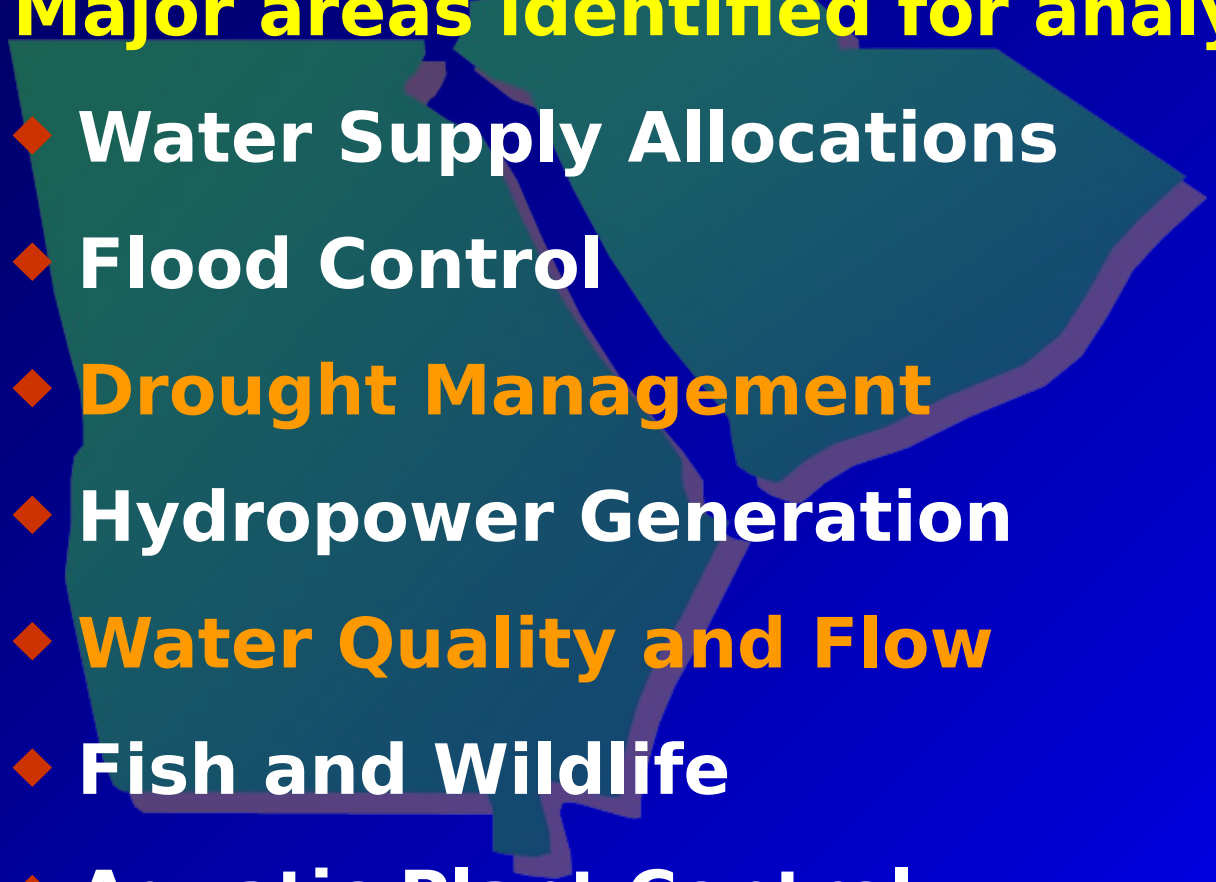
Corps of Engineers, Georgia DNR, South Carolina DNR

Savannah River Basin Comprehensive Study

Savannah District

Major areas identified for analysis:

- Water Supply Allocations
- Flood Control
- Drought Management
- Hydropower Generation
- Water Quality and Flow
- Fish and Wildlife
- Aquatic Plant Control
- Recreation



SRB Comp Study

Savannah District

Study Approach

Establish Existing Condition (Base) in HEC-ResSim

- Current Operational Rules
- Water Supply Needs (2003)
- Hydropower Requirements

Drought Plan Operations

- **Objective- To assess the impacts of different drought rules, triggers, and their timing**
- **New Drought of Record (1998-2003) was used for analysis**

SRB Comp Study (Drought)

Savannah District

- **1A. During drought recovery increase flows when return elevations are X feet above setting elevation**
  - **1) X = 1 ft**
  - **2) X = 2 ft**
- **2A. Increase the number of drought triggers for drought management and return from drought to provide a more gradual transition to 3600cfs.**
- **3A. Lower the minimum drought-trigger 3 JST releases to 3300 cfs (3A1) and 3000 cfs (3A2) with a rule to maintain 3600 cfs at the lock and dam. Similar to EA proposed during recent drought.**
- **4A. Raise minimum level 3 JST releases to 3800 cfs to determine or illustrate pool elevation differences.**

SRB Comp Study (Drought)

Savannah District

- **5A. Maximize RBR pumping during drought within current environmental operational limits.**
  - **1. Two pump units June thru Sept.**
    (w/o JST O2 system; same as Base)
  - **2. Four pump units available June thru Sept.**

- **6A. Add flow restrictions at JST for drought trigger 1 condition. (eg 5200 cfs)**

- **7A. Adjust Level 3 elevations at Hartwell and JST from 646 and 316 to**

  1) 648 and 318

  2) 649 and 319

SRB Comp Study (Drought)

- **Basin Stakeholders Meeting – 3/4/2005**
  - **4 Workshop Groups:**
    - **Hydro**
    - **Recreation and Homeowners**
    - **Environmental (Lakes & River)**
    - **Water Supply and Water Quality**
  - **What Drought Alternatives are Most Important**
  - **What Combinations will be best ?**

SRB Comp Study (Drought)

Savannah District

- **Preferred combinations or most important alternatives for Drought Plan Update**
  - **1A2. During drought recovery increase flows when return elevations are 2 feet above setting elevation**
    4A. Raise minimum level 3 JST releases to 3800 cfs to determine or illustrate pool elevation differences.
    5A2. Maximize RBR pumping during drought within current environmental operational limits with four units in summer. 6A. Different Flow restrictions between 4500 and 3600 cfs for drought triggers 1,2, 3.

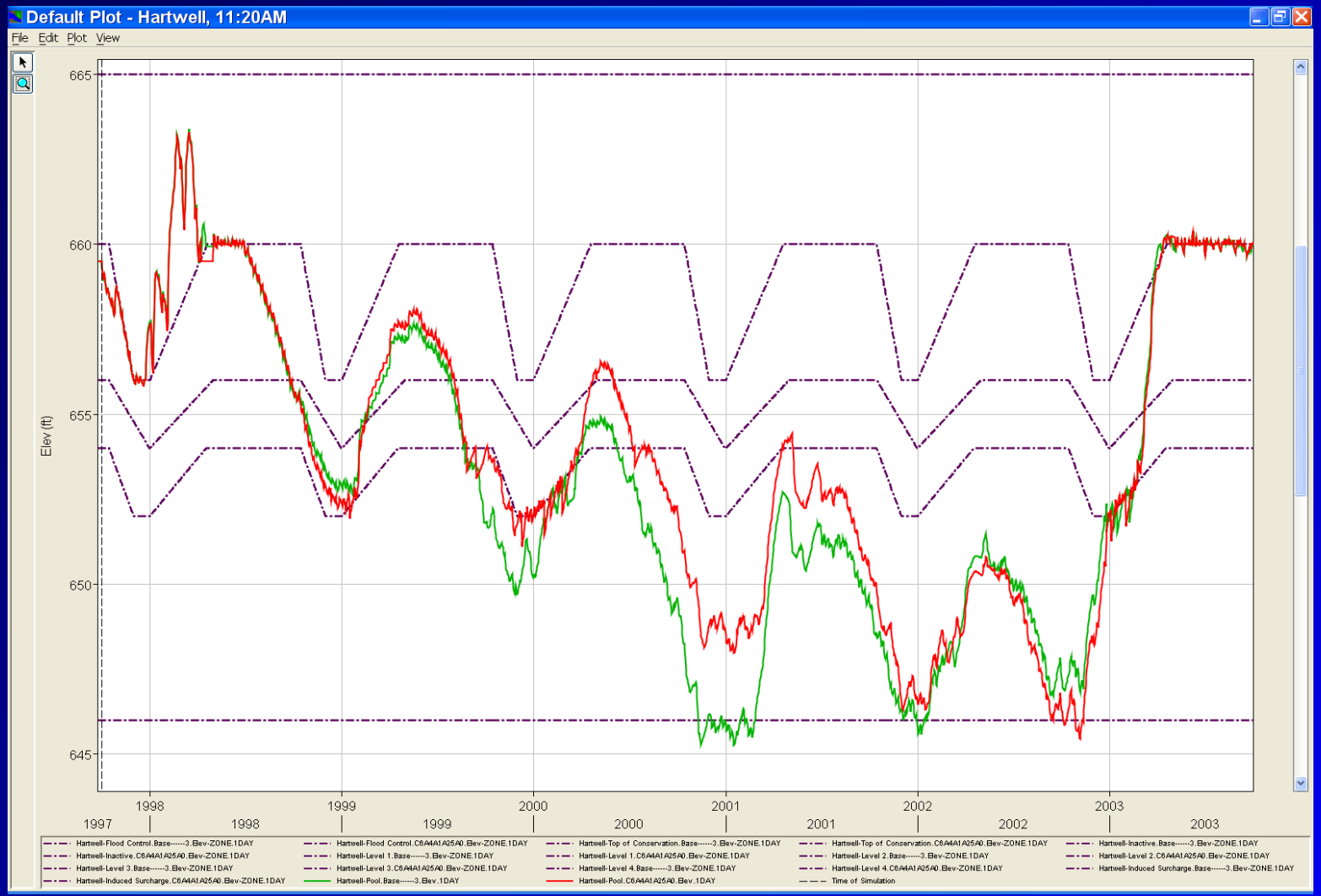
  - **1A2. During drought recovery increase flows when return elevations are 2 feet above setting elevation**
    4A. Raise minimum level 3 JST releases to 3800 cfs to determine or illustrate pool elevation differences.
    5A2. Maximize RBR pumping during drought within current environmental operational limits with four units in summer.

Potential Changes to Thurmond Releases

Base	Drought Zone	Preferred Alternative
Safety Notice	Level 1	4200cfs Max
4500cfs Max	Level 2	4000cfs Max
3600cfs Spec	Level 3	3800cfs Spec

Hartwell

Savannah District



Base

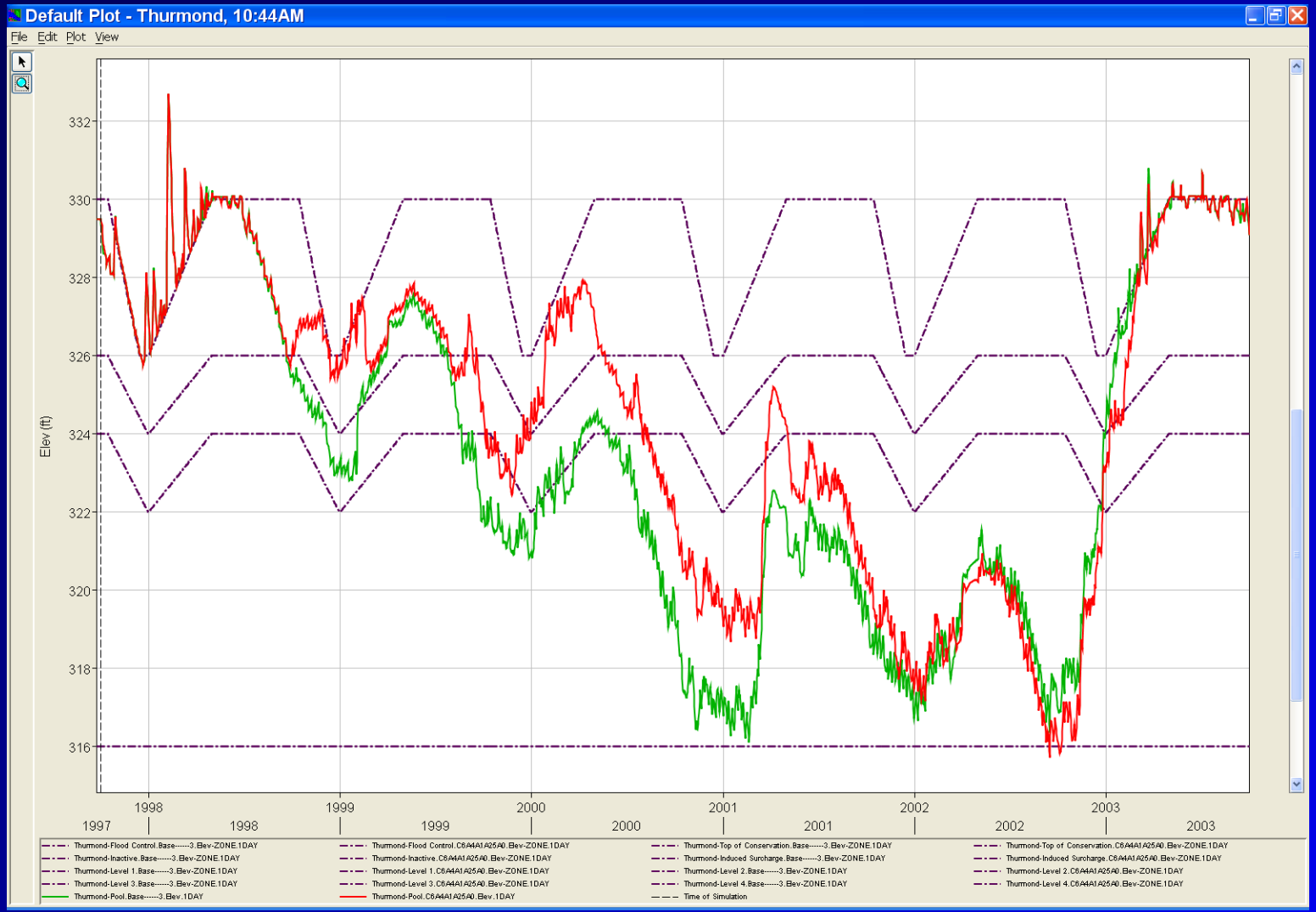
Alternative

<= 3 feet higher early

~ 1 foot lower late

Thurmond

Savannah District



Base

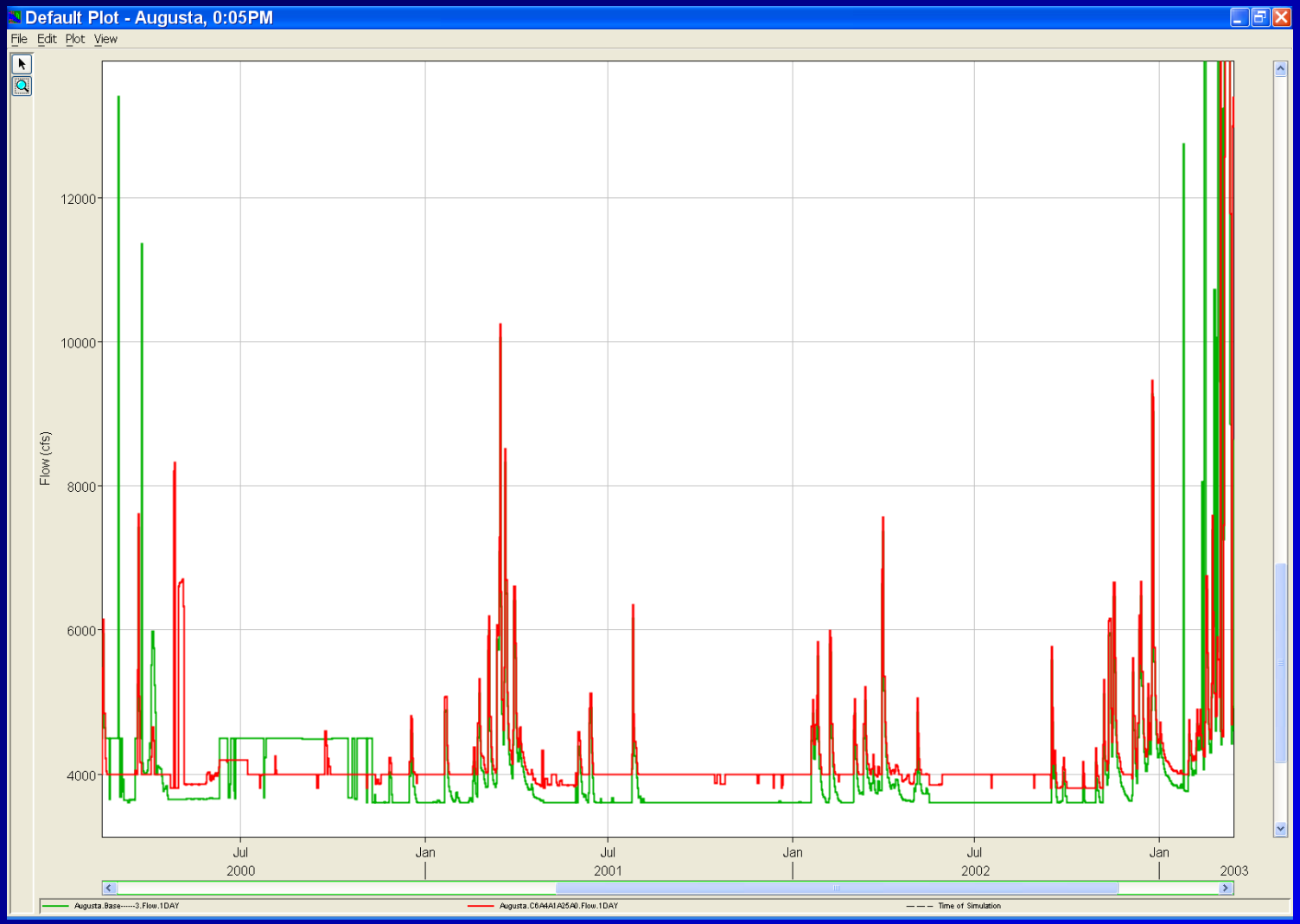
Alternative

<= 3 feet higher early

~ 1 foot lower late

Augusta Flow

Savannah District



Base

Alternative

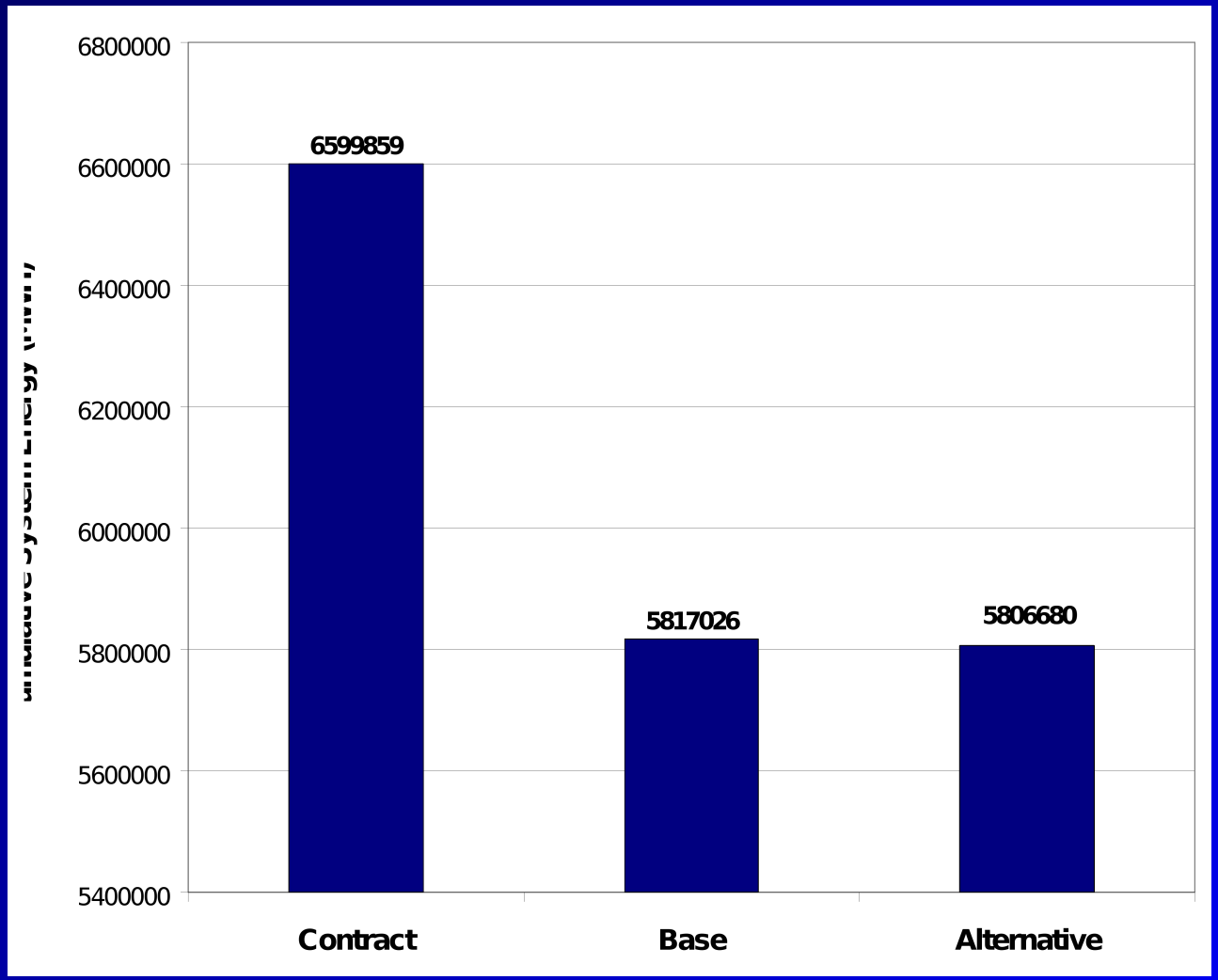
Lower Q Early

Higher Q Late

Hydropower Shortages

June 1998 – April 2003

Savannah District



Conclusions

Preferred Drought Alternative

- ~ 3 feet higher pool early and 1 foot lower later in drought
- Similar hydro energy shortages
- Additional Russell Pumping or replacement energy is required during drought ($)
- ResSim will be used for Phase II and real-time operations

Environmental Evaluation Process

Savannah District

- **Define the Proposed Action**
- **Evaluate Potential Environmental Effects**
- **Prepare Draft Environmental Assessment**
- **Public and Agencies Review**
- **Finalize the EA**
- **Make Federal Decision (Sign Finding of No Significant Impact)**

Fiscal Year 2005 Milestones

Savannah District

Task	*Completion Date*
Finalize Combination of Alternatives for Drought Management Plan Update	**15 April 05**
Begin NEPA Document Preparation for Drought Management Plan Update	**15 April 05**
NEPA Document Review	**14 July – 15 Aug 05**
Finalize NEPA Document	**31 Aug. 05**
Complete Drought Management Plan Update	**30 Sept. 05**

Questions ?